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(71)Applicant : OJI PAPER CO LTD

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(72)Inventor : RIYUU HA
NEMOTO HIROYUKI

(54) INK JET RECORDING BODY

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an ink jet recording sheet having the superiority of high gloss, a coloring property, water resistance, high printing concentration, ink blotting property, and qualified fineness.

SOLUTION: This recording body is formed having an ink receptor layer set on the sheet support body. In this instance, the ink receptor layer has a layer formation of one layer or more, and at least, one layer is formed by coating liquid containing silica colloid particles including secondary particles consisting of coagulated silica primary particles having a particle diameter of 3nm-40nm and a water soluble resin, and an average particle diameter of the silica colloid particles is 10nm-300nm.

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CLAIMS

[Claim(s)]

[Claim 1] It is the ink jet record object which this ink absorbing layer has the lamination of one or more layers in the ink jet record object which established the ink absorbing layer in the base material, and is characterized by at least one layer being the colloidal particle which consists of a secondary particle with a mean particle diameter of 10nm - 300nm which a primary silica particle with a particle size of 3nm - 40nm comes to condense, and a layer containing water soluble resin.

[Claim 2] The ink jet record object according to claim 1 with which water soluble resin contains with a degrees of polymerization of 2000 or more polyvinyl alcohol.

[Claim 3] The ink jet record object according to claim 1 or 2 with which water soluble resin contains 95% or more of poly vinyl alcohol whenever [saponification].

[Claim 4] The ink jet record object according to claim 1, 2, or 3 which a base material comes to imprint through the middle class who has adhesion or an adhesive property after an ink absorbing layer carries out application membrane formation on a molding side.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the sheet for ink jet record which is excellent in high-glossiness, ink absorptivity, a water resisting property, weatherability, high printing concentration, and color enhancement about the sheet for ink jet record.

[0002]

[Description of the Prior Art] An ink jet recording method is a method which the liquid ink drop injected at high speed is made to adhere to a recorded material, and records it from a nozzle, and has the descriptions, like full-color-izing being easy and the printing noise are low. By this method, since the ink used contains a lot of solvents, in order to obtain high record concentration, it is necessary to use a lot of ink. Moreover, since a liquid ink drop is injected continuously, before the first drop is absorbed, the following drop is injected, and it is easy to produce un-arranging [that a liquid ink drop unites and the dot of ink joins]. Therefore, when the concentration of a printing dot being high and a color tone's being brightly skillful as a record sheet used by this ink jet recording method and absorption of ink are quick and a printing dot laps, it is required that there is no blot of ink etc.

[0003] About common coated paper, the porous pigment was formed as an ink absorbing layer (one layer or multilayer) as an application layer, control of the color nature and sharp nature which determine image quality was performed, and improvement in color reproduction nature or image repeatability has been aimed at. For example, as indicated by JP,62-111782,A, JP,63-13776,A, and JP,63-104878,A, the sheet for ink jet record which added the binder and prepared the ink absorbing layer is mentioned, using the primary particle or aggregated particle which has pore as a pigment (generally a silica, an alumina, etc. are used). Furthermore, in order to raise a quality of printed character and to gather ink rate of absorption as indicated by JP,63-22977,B, the pore which has a peak at 0.2-10micro is prepared, and the absorbed ink is incorporated to the opening which consists of 0.05micro or less of apertures, and what offers the higher-definition sheet for ink jet record is mentioned to the maximum upper layer of an ink absorbing layer.

[0004] However, corresponding to the rapid spread of ink jet printers, the printed matter of the photograph average which has high gloss for applications, such as various publications and a package, is called for in the printing field. Especially in color record, needs the film from the point of ink acceptance nature, such as absorption of ink, a fixing rate, and ink absorption capacity, and coated paper type are high in the configuration (the shape of a perfect circle) of a dot, and the sharpness of a dot. In order to give porosity, the ink absorbing layer shown above needs to enlarge the pigment itself, or needs to enlarge a secondary particle (micron order). When a pigment becomes large, it is difficult the smooth nature of the front face of an ink absorbing layer is not not only to obtain, but to be able to prevent transparency of light, and for an ink absorbing layer to become opaque, and to desire gloss.

[0005] Although a certain amount of [although it is the purpose which gives gloss and many record sheets for ink jets which applied the resin which absorbs ink by the dissolution and swelling are marketed / the thing which is going to make it absorb ink by the dissolution and

swelling of such resin] gloss is acquired, the present condition is that whose rate of drying of ink is slow and moisture-proof and a water resisting property do not have, either. [good]

[0006] In order to acquire smooth nature and glossiness, carrying out an ink absorbing layer more than two-layer, and using the upper layer as a gloss manifestation layer recently is proposed (for example, : JP,3-215080,A, JP,3-256785,A, JP,7-89220,A, JP,7-101142,A, JP,7-117335,A, etc.). The complex of a colloidal particle or a colloidal particle is well used as a principal component of these gloss manifestation layers. In order to maintain transparency and ink absorptivity, a gloss manifestation layer adds a macromolecule latex to a colloidal particle as adhesives, and it is made to form it. Although it will be easy to produce a small crack in a paint film and ink rate of absorption will be maintained by the small crack if a macromolecule latex is used as adhesives, the circumference of the dot of the obtained ink will be notched, it will become far from the shape of a perfect circle, and the clearness and delicacy of an image will be considerably missing. Moreover, there is the description to which breadth and the dot to like become [ink] large. Although it does not become a problem especially on the printing level of 360dpi, the actual condition is that a dot and a dot will join [a dot] for a breadth and cone reason if it becomes the high density record beyond 720dpi, and a delicate image is not obtained. Moreover, many ink fixing layers are prepared rather than the coverage of a gloss manifestation layer in the bottom of a gloss manifestation layer, in order that an ink fixing layer may use the secondary particle of micron order, it does not have the transparency of the whole ink absorbing layer, its printing concentration is inadequate, and it is impossible to obtain high gloss with a feeling of gloss.

[0007] Since the particle used the dispersing elements (colloidal silica, alumina sol, etc.) of a primary particle although the ink absorbing layer constituted with with a particle 0.1micro or less and a degrees of polymerization of 4000 or more polyvinyl alcohol was also indicated as indicated by JP,7-117334,A in order to improve the crack of an ink absorbing layer, ink absorptivity and the transparency of an acceptance layer cannot be balanced. Since the primary particle itself does not have ink absorptivity, ink is absorbed by the clearance between primary particles. In order to make membranes form, adhesives (binder) must be made to intervene between primary particles, since the dispersing element of a primary particle was used. High coverage is indispensable, in order for ink absorption capacity to become small and to carry out full absorption of the part with many amounts of ink, if adhesives exist between particles. If it becomes high coverage, it will be easy to produce a crack in a paint film. Moreover, in order to acquire paint film transparency, what has a small particle size of a primary particle must be chosen, if particle size is small, ink rate of absorption will fall remarkably, and on the other hand, if particle size is large, the transparency of a paint film will worsen and it will worry about the fall of printing concentration.

[0008] Then, the ink absorbing layer using the colloidal particle containing the secondary particle which a primary boehmite particle 60A or more condenses, and crystal thickness becomes as indicated by JP,5-32413,A was indicated. It is the configuration which is made to absorb water and the solvent (for about 90% or more in an ink component to be occupied) with comparatively small molecular weight in ink between small primary particles, is made to absorb the color in ink between big secondary particles, and is established. However, boehmite is one kind of the crystalline of an alumina, and a particle is pillar-shaped or presents a needlelike form. The shape of a needle and the secondary particle condensed since it was pillar-shaped have bad membrane formation nature, and a crack tends [comparatively] to produce it. Moreover, bad color-enhancing ink (for example, : red, such as the ASHITTO red 52 (Food Red No106)) with an alumina is not turned to, and there is a problem which is easy to yellow the boehmite layer itself with time. Since cost of boehmite is also high, a general application has the fault which is not suitable. Ink rate of absorption is quick, color enhancement with ink is good, and a water resisting property, stability with the passage of time, etc. are good, and the design of a transparent ink absorbing layer serves as a big technical problem.

[0009]

[Problem(s) to be Solved by the Invention] This invention solves the above-mentioned problem, and color enhancement with ink is more good, and it aims at offering the sheet for ink jet record

of weatherability, a water resisting property, high gloss, and high printing concentration.

[0010]

[Means for Solving the Problem] Although it is opaque although the silicas of general marketing are fine particles with a diameter of several microns and ink absorptivity is high, and it is usable as common coated paper, it is impossible to take out high printing concentration and printing gloss. Moreover, since particle size is large, a front face considerably and it is also difficult to graduate. It succeeded in both the transparency of an ink absorption layer and ink absorptivity designing a good porous layer by this invention's making silica floc the silica colloidal particle which consists of a secondary particle with a mean particle diameter of 300nm or less, as a result of repeating examination wholeheartedly, and choosing water soluble resin as adhesives.

[0011] Since especially this invention used the silica colloidal particle, the sheet for high gloss ink jet record also with good color enhancement and weatherability which an alumina (boehmite) does not have is obtained. The silica colloidal particle of this invention needs to be a silica colloidal particle solution which consists of a secondary particle which the primary particle condensed and was made substantially. When it is the silica sol (for example, : colloidal silica of general marketing) in which the primary particle carried out mono dispersion, the porous layer which applies to a base material and is obtained will become comparatively precise, and it is easy to lose transparency, and high coverage is not avoided in order to give sufficient ink absorptivity. If it becomes high coverage, a crack will tend to go into a paint film, and a spreading process will also tend to become complicated. Of course, a primary particle may be partially contained in the silica colloidal particle solution of this invention.

[0012] The silica colloidal particle of this invention has indispensable addition of a binder, in order not to not much have a self-adhesive property, and to obtain an ink absorbing layer. If the whole ink absorbing layer of the sheet for ink jet record of this invention is constituted by the principal component in a silica colloidal particle and water soluble resin (especially polyvinyl alcohol is desirable), it is possible for the feeling of transparence of the printing section to be obtained and to acquire about the same gloss as a photograph. Moreover, since the whole ink absorbing layer is transparent, it can be used also as a sheet for OHP etc. Furthermore, if it imprints on a base material through an interlayer after carrying out application membrane formation of the ink absorbing layer of this invention in a molding side, gloss will improve remarkably and high smoothing and the sheet for ink jet record of high gloss will be obtained more.

[0013] Although this invention includes the following operation aspects, it is not restricted to these.

[1] It is the ink jet record object which this ink absorbing layer has the lamination of one or more layers in the ink jet record object which established the ink absorbing layer in the base material, and is characterized by at least one layer being the colloidal particle which consists of a secondary particle with a mean particle diameter of 10nm - 300nm which a primary silica particle with a particle size of 3nm - 40nm comes to condense, and a layer containing water soluble resin.

[0014] [2] The ink jet record object given in [1] with which water soluble resin contains with a degrees of polymerization of 2000 or more polyvinyl alcohol.

[3] [1] in which water soluble resin contains 95% or more of poly vinyl alcohol whenever [saponification], or an ink jet record object given in [2].

[0015] [4] [1] which a base material comes to imprint through the middle class who has adhesion or an adhesive property after an ink absorbing layer carries out application membrane formation on a molding side, [2], or an ink jet record object given in [3].

[0016] [5] [1] which contains cationic resin all over an ink absorbing layer, [2], [3], or an ink jet record object given in [4].

[0017] [6] An interlayer is an ink jet record object given in [4] characterized by being at least one chosen from thermoplastics, adhesives, and a pressure sensitive adhesive.

[7] A molding side is an ink jet record object [4] which is the film which has the Takahira glide plane, a laminated paper, glassine, inorganic glass, or a surface of metal, or given in [6].

[0018] [8] It is the sheet for ink jet record which this ink absorbing layer applies the coating

liquid containing the colloidal particle and water soluble resin of the silica containing the secondary particle which has the lamination of one or more layers and the primary silica particle whose at least one layer is the particle size of 3nm - 40nm comes to condense in the sheet for ink jet record which established the ink absorbing layer in the sheet-like base material, and is obtained, and is characterized by the mean particle diameter of the colloidal particle of this silica being 300nm or less.

[0019] [9] It is the sheet for ink jet record which this ink absorbing layer applies the coating liquid containing the silica sol containing the secondary particle which has the lamination of one or more layers and the primary silica particle whose at least one layer is the particle size of 3nm - 40nm comes to condense, and water soluble resin in the sheet for ink jet record which established the ink absorbing layer in the sheet-like base material, and is obtained, and is characterized by the mean particle diameter of this silica sol being 300nm or less. In addition, a sol says the colloid which makes a liquid a dispersion medium.

[0020] The colloidal silica of general marketing is the dispersing element of a primary particle, and differs from the silica colloidal particle of this invention. The ink jet record object containing colloidal silica is inferior to this patented article in respect of record concentration and ink absorption capacity.

[0021]

[Embodiment of the Invention] In this invention, sheets, such as papers, such as films, such as cellophane, polyethylene, polypropylene, plasticized polyvinyl chloride, rigid polyvinyl chloride, and polyester, paper of fine quality, art paper, coat paper, cast coated paper, a metallic paper, kraft paper, a polyethylene laminated paper, an impregnated paper, vacuum evaporations paper, and water-soluble paper, metal foil, and a synthetic paper, are suitably used as a base material, for example.

[0022] Next, detail explanation is given about the ink absorbing layer of this invention. First, the layer constituted considering said silica colloidal particle containing the secondary particle which a primary silica particle with a particle size of 3nm - 40nm which constitutes the ink absorbing layer of this invention comes to condense as a principal component is explained.

[0023] As for the colloidal particle of a silica, particle size says the condition that the particle about 1000nm or less distributed to homogeneity. Especially the adjustment approach of the silica colloidal particle used for this invention is not limited. For example, the non-[synthetic] fixed form silica (several microns) of general marketing is obtained by giving the strong force by the mechanical means. That is, breaking It is obtained by the down method (how to subdivide a massive raw material). The silica colloidal particle of this invention may be a slurry. As a mechanical means, the mechanical technique of a supersonic wave, a high-speed tumbling mill, a roller mill, a container drive medium mill, a medium stirrer mill, a jet mill, automated mortar, a Sand grinder, etc. is mentioned.

[0024] All the mean particle diameter as used in the field of this invention is the particle size observed with the electron microscope (SEM and TEM) (what took the 10,000 to 400,000 times as many electron micrograph as this, and measured and averaged the diameter of Martin of the particle in 5cm around.). It is indicated in a "particle handbook", Asakura Publishing, p1991 [52,], etc. The mean particle diameter of the silica colloidal particle (substantially secondary particle) used by this invention is 10-300nm, and is preferably adjusted to 20-200nm. If mean particle diameter uses the silica colloidal particle exceeding 300nm, a feeling of transparence will be lost remarkably, printing concentration will fail remarkably, and the sheet for ink jet record which has the high gloss after desired printing will not be obtained. On the other hand, use of a silica colloidal particle with very small mean particle diameter does not obtain ink rate of absorption.

[0025] It is necessary to adjust the primary particle which constitutes the silica colloidal particle used for an ink absorbing layer to 3nm - 40nm. If set to less than 3nm, the opening between primary particles will become extremely small, and the capacity which absorbs the solvent and ink in ink declines remarkably. On the other hand, when a primary particle exceeds 40nm, the condensed secondary particle becomes large and there is a possibility that the transparency of an ink absorbing layer may fall.

[0026] Since there is no membrane formation nature not much, the silica colloidal particle itself manufactured by this invention has indispensable addition of adhesives, when preparing as an ink absorbing layer. It is used by water soluble resin as adhesives (binder), adding suitably. As water soluble resin, cellulose, such as polyvinyl alcohol (Following PVA is called), casein, soybean protein, synthetic protein, starch, a carboxymethyl cellulose, and methyl cellulose, etc. can be illustrated, for example. Distributed fitness and coating stability to PVA is the most effective. In order to acquire especially dispersibility and ink absorptivity, with a polymerization degree of 2000 or more PVA is preferably used as water soluble resin. The polymerization degree of PVA is 2000-5000 more preferably. Moreover, in order to obtain a water resisting property, 95% or more of PVA is [whenever / saponification] effective.

[0027] although especially the solid content weight ratio of a silica colloidal particle and water soluble resin manufactured by this invention does not limit -- $10 / 1 - 10/10$ -- it is preferably adjusted in the range of $10 / 2 - 10/6$. If there are many additions of water soluble resin, the pore between particles becomes small and ink rate of absorption may not be obtained, and on the other hand, if there are few adhesives, a crack may go into an application layer and it may be in the condition that it cannot be used.

[0028] Of course, other pigments may be suitably blended in addition to the silica colloidal particle / adhesives (binder) manufactured by this invention if needed. For example, the various pigments of well-known official business are suitably used in the common coated paper fields, such as colloidal silica (dispersing element of a primary particle), a kaolin, clay, baking clay, a zinc oxide, tin oxide, magnesium sulfate, an aluminum oxide, an aluminum hydroxide, a calcium carbonate, a satin white, aluminum silicate, a smectite, a zeolite, a magnesium silicate, a magnesium carbonate, magnesium oxide, diatomaceous earth, a styrene system plastics pigment, a urea-resin system plastics pigment, and a benzoguanamine system plastics pigment. However, in order to maintain the smooth nature and transparency of a coating layer, as for the amount of other pigments used, it is desirable to adjust to 20% or less to the silica colloidal particle manufactured by this invention. Moreover, in order to maintain the transparency of an ink absorbing layer, as for the mean particle diameter of the pigment added in a silica colloidal particle, it is desirable that it is 2micro or less.

[0029] Cationic resin may be added and used all over the ink absorbing layer of this invention. Thereby, it can raise ink fixable. As cation resin added, polyalkylene polyamine, such as a polyethylene amine and polypropylene polyamine, or the derivative of those, the acrylic resin that has the 3rd class amino group and the 4th class ammonium, a JIAKURIRU amine, etc. are mentioned, for example. in addition -- as the addition of cation resin -- the pigment 100 weight section -- receiving -- $1 - 30$ weight section -- it is more preferably adjusted in the range of $5 - 20$ weight section. In addition, various assistants, such as the dispersant used in common coated paper manufacture, a thickener, a defoaming agent, a coloring agent, an antistatic agent, and antiseptics, are added suitably.

[0030] although especially the amount of applications is not what is limited -- $1 - 100$ g/m² -- more -- desirable -- $5 - 60$ g/m² It adjusts. if many [if there are few amounts of coating, a homogeneity paint film will be hard to be obtained, and] -- effectiveness -- being saturated -- moreover, a paint film -- a crack -- being generated -- **** -- ** For example, 15 g/m² In order to obtain the above amount of high applications, the approach by thickening of application liquid and high-concentration-izing can be used, and two applications or more realize.

[0031] Although the layer containing the silica colloidal particle manufactured by this invention was explained, there is this one layer or it may be a multilayer. If an ink absorbing layer is constituted by only the silica colloidal particle layer, color enhancement, printing concentration, a feeling of gloss, and transparency are the best. Of course, even if it prepares a silica colloidal particle application layer in the upper layer and establishes other ink absorbing layers in a lower layer, the sheet for ink jet record with good high ink rate of absorption made into the purpose of this invention, color enhancement, high printing concentration, high gloss, weatherability, and water resisting property is obtained. In order to maintain the gloss after printing, and a feeling of gloss, it is desirable to be adjusted to the whole ink absorbing layer in the range whose amount of applications of the layer which uses a silica colloidal particle as a principal component is $50 -$

100%. Although fixed gloss is acquired at least less than 50%, especially in the mode which makes a silica colloidal particle content layer 50 - 100%, about the same gloss as a photograph and a feeling of gloss are obtained.

[0032] Next, an ink absorbing layer besides the above used as a lower layer (layer near a base material) is explained concretely. As a pigment (mean particle diameter: 0.5micro or more) used for other ink absorbing layers, the various pigments of well-known official business are suitably used in the common coated paper fields, such as a non-[synthetic] fixed form silica, clay, an alumina, and a smectite. A non-[synthetic] fixed form silica is preferably used from viewpoints, such as color enhancement and printing concentration.

[0033] As adhesives (binder), what has water soluble resin, such as PVA and casein which were shown above, and starch, or a conventionally well-known latex, a conventionally well-known synthetic-resin emulsion, etc. is raised. the addition of adhesives -- the pigment 100 weight section -- receiving -- the 5 - 150 weight section -- it is preferably adjusted in the range of 10 - 50 weight section. Moreover, the cation resin used in order to improve can also add ink fixable, and the above mentioned amine system etc. is mentioned. in addition, the addition of cation resin -- the pigment 100 weight section -- receiving -- 1 - 30 weight section -- it is more preferably adjusted in the range of 5 - 20 weight section. In addition, various assistants, such as the dispersant used in common coated paper manufacture, a thickener, a defoaming agent, a coloring agent, an antistatic agent, and antiseptics, are also added suitably.

[0034] Although especially the amount of applications of other ink absorbing layers is not limited, it is desirable to be adjusted to 3 - 30 g/m². When few, there is no semantics which prepared the ink absorbing layer, on the other hand, if many [too], effectiveness will be saturated, and it is meaningless.

[0035] as the application coating machine for obtaining which ink absorbing layer -- various kinds, such as a blade coating machine, an air knife coater, a roll coater, a bar coating machine, a gravure coating machine, a rod blade coating machine, a lip coating machine, and a curtain coating machine, -- well-known application equipment can be illustrated.

[0036] An ink absorbing layer (the upper layer and a lower layer are included) can be formed with application equipment on a base material. Moreover, an ink absorbing layer is formed in a molding side, the interlayer who has adhesiveness or an adhesive property in a base material (or ink absorbing layer) depending on the case is prepared, an interlayer and an ink absorbing layer (or base material) can be pasted up, and an ink absorbing layer can be prepared by exfoliating only a molding side. Thus, if an ink absorbing layer is formed using a molding side, the more excellent glossiness will be acquired. If a silica colloidal particle content layer is prepared using a molding side, the especially excellent gloss will be acquired. Although the case where lamination and a molding side are exfoliated is explained in detail so that application membrane formation of the ink absorbing layer may be carried out in a molding side, an interlayer may be prepared in a base material and an ink absorbing layer and an interlayer may meet below, the mode which prepares an interlayer in an ink absorbing layer can be performed similarly.

[0037] As the adhesion approach, the laminating method is effective. As a laminating method, the method of laminating well-known official businesses, such as the dry laminate method, the wet laminating method, the hot melt laminating method, and the EKUSUTORUJUN laminating method, can be illustrated. By a wet lamination, dry laminate, and the hot melt laminating method, adhesive resin and a binder are applied to a base material, an interlayer is prepared, after carrying out lamination ***** so that an interlayer and an ink absorbing layer may meet, a molding side is removed and the desired sheet for ink jet record is obtained. By the extrusion laminating method, the polyethylene (the same approach is used also when using resin other than polyethylene) by which heating melting was carried out at 280-320 degrees C into the melting extruder is poured on the surface of a base material, after carrying out cooling sticking by pressure with the molding object and lamination which have an ink absorbing layer, and a cooling roll, a molding object is removed and the desired sheet for ink jet record is obtained.

[0038] When using a pressure sensitive adhesive as the middle class, after using the application approach of well-known official businesses, such as a bar coating machine, a roll coater, and a lip coating machine, and carrying out application desiccation at a base material, a molding side can

be removed from an ink absorbing layer and *****, and the desired record sheet for ink jets can be obtained. An interlayer's amount of applications is 2 - 50 g/m², even when using any of thermoplastics, adhesives, and a pressure sensitive adhesive, although it does not limit especially if an ink absorbing layer and a base material can be pasted up. Extent is desirable. If there are few amounts of applications, sufficient adhesive strength is hard to be obtained, on the other hand, even if many, effectiveness is saturated, and it is meaningless.

[0039] as the giant-molecule resin used for the middle class -- thermoplastics (for example, : -- ethyl cellulose --) Vinyl acetate resin and its derivative, polyethylene, an ethylene-vinyl acetate copolymer, Polyvinyl alcohol, acrylic resin, polystyrene, and its copolymer, A polyisobutylene, hydrocarbon resin, polypropylene, polyamide resin, The thermoplastics of various well-known official businesses, such as polyester resin, is mentioned. adhesives (thermosetting resin, such as a urea-resin, phenol resin, an epoxy resin, and Pori isocyanate resin, --) Polyvinyl acetal/phenol resin, rubber/phenol resin, Rubber radical adhesives, such as compound polymer mold adhesives, such as epoxy/Nylon, and a latex former rubber radical, The adhesives of various well-known official businesses, such as hydrophilic naturally-occurring-polymers adhesives, such as starch, glia, and casein, are mentioned. A pressure sensitive adhesive (the pressure sensitive adhesive of various well-known official businesses, such as a solvent mold pressure sensitive adhesive, an emulsion mold pressure sensitive adhesive, a hot melt mold pressure sensitive adhesive, and a delay DOTAIPU pressure sensitive adhesive, is mentioned) is used suitably.

[0040] The plates which have high smooth front faces, such as sheets which have flexibility, such as papers, such as films, such as the cellophane which has high surface smooth nature, polyethylene, polypropylene, plasticized polyvinyl chloride, rigid polyvinyl chloride, and polyester, a polyethylene laminated paper, glassine, an impregnated paper, and vacuum evaporation paper, metal foil, and a synthetic paper, as an ingredient used for a molding side and inorganic glass, a metal, and plastics, are used suitably. Especially, the high polymer film from viewpoints, such as application fitness and the exfoliation fitness of a molding side and an ink absorbing layer, a polyethylene (polyethylene, polypropylene, polyester, etc.) laminated paper, glassine, and inorganic glass are desirable.

[0041] The smoother one of a molding side is desirable in respect of glossiness, 0.5 micrometers or less of Ra are [the surface roughness (JISB0601) of a molding side] desirable, and Ra is 0.05 micrometers or less more preferably. Although no to process is still possible for it, in order to improve the detachability of a molding side and an ink absorbing layer, even if a molding side applies to the application side of a molding side the resin which has the detachability of silicone, a fluororesin, etc., it is usable. It is also effective to carry out surface hydrophilization by corona discharge or plasma treatment to a molding side from viewpoints, such as application fitness (HAJIKI etc.).

[0042] The application process of the ink absorbing layer when imprinting to a base material through an interlayer is contrary to said general application process. That is, the maximum upper layer (silica colloidal particle content layer) of an ink absorbing layer is previously applied to a molding side, and the sequential application of the ink absorbing layer besides the above is carried out on it. The ink absorbing layer of the sheet for ink jet record obtained by imprinting to a base material becomes the same built-up sequence as said application sheet in order of the upper layer and other ink absorbing layers (lower layer).

[0043] The solvent object for dissolving or distributing the coloring matter and this coloring matter for forming an image as ink used by the ink jet record approach of this invention is used as an indispensable component, and if needed, the dissolution or a distributed stabilizing agent of various dispersants, a surfactant, a viscosity controlling agent, a specific resistance regulator, pH regulator, an antifungal agent, and a record agent etc. is added, and it is adjusted.

[0044] Although direct dye, acid dye, basic dye, reactive dye, a food color, a disperse dye, fat dye, various pigments, etc. are raised as a record agent used for ink, a well-known thing can be conventionally used especially without a limit. Although the content of such coloring matter is determined depending on the class of solvent body constituent, the property required of ink, there is especially no problem at use to which it becomes as [combination / in conventional

ink], i.e., about 0.1 – 20% of the weight of a rate, also in the ink in this invention.

[0045] As a solvent of the ink used by this invention, water and water-soluble, various organic solvents, For example, methyl alcohol, ethyl alcohol, n-propyl alcohol, The alkyl alcohols of the carbon numbers 1-4, such as isopropyl alcohol, n-butyl alcohol, and isobutyl alcohol, A ketone or ketone alcohol, such as an acetone and diacetone alcohol, Polyalkylene glycols, such as a polyethylene glycol and a polypropylene glycol Ethylene glycol, a polo pyrene glycol, a butylene glycol, Triethylene glycol, thiodiglycol, hexylene glycol, Alkylene groups, such as a diethylene glycol, 2-6 alkylene glycol Ether, such as amides, such as dimethylformamide, and a tetrahydrofuran, The low-grade alkyl ether of polyhydric alcohol, such as a glycerol, ethylene glycol methyl ether, the diethylene-glycol methyl (ethyl) ether, and the triethylene glycol monomethyl ether, is mentioned.

[0046]

[Example] Although an example is given to below and this invention is explained more concretely, of course, it is not limited to these. Moreover, unless it refuses, the section in an example and especially % are the sections of solid content and %s except water, and show weight section and weight %, respectively. After processing all the sheets for ink jet record obtained by this invention by the supercalender (linear pressure: 20 kg/cm), they were used for evaluation.

[0047] After the Sand grinder distributed using the non-[synthetic] fixed form silica (silica [Japanese] industrial company make, trade-name:Nipsil LP, primary particle diameter: 16nm) with a [silica colloidal particle A] mean particle diameter of 9micro, the supersonic wave was applied, distributed actuation of a Sand grinder and a supersonic wave was repeated until mean particle diameter was set to 50nm, and 8% of water solution was prepared.

After the Sand grinder distributed using the non-[synthetic] fixed form silica (silica [Japanese] industrial company make, trade-name:Nipsil NS, primary particle diameter: 21nm) with a [silica colloidal particle B] mean particle diameter of 9micro, the supersonic wave was applied, distributed actuation of a Sand grinder and a supersonic wave was repeated until mean particle diameter was set to 100nm, and 12% of water solution was prepared.

After the Sand grinder distributed using the non-[synthetic] fixed form silica (silica [Japanese] industrial company make, trade-name:Nipsil HD-primary [2 or] particle diameter: 11nm) with a [silica colloidal particle C] mean particle diameter of 3micro, the supersonic wave was applied, distributed actuation of a Sand grinder and a supersonic wave was repeated until mean particle diameter was set to 200nm, and 15% of water solution was prepared.

After the Sand grinder distributed using the non-[synthetic] fixed form silica (silica [Japanese] industrial company make, trade-name:Nipsil LP, primary particle diameter: 16nm) with a [silica colloidal particle D] mean particle diameter of 9micro, the supersonic wave was applied, distributed actuation of a Sand grinder and a supersonic wave was repeated until mean particle diameter was set to 500nm, and 15% of water solution was prepared.

[0048] The amount of applications is 8% water solution which mixed the PVA(whenever [Kuraray Co., Ltd. make, trade name-VA-124, degree-of-polymerization:2400, and saponification]: 98.5%) 40 section in the example 1 silica colloidal particle A100 section at MEIYABA 20 g/m2 Application desiccation was carried out on the surface of the base material so that it might become, and the sheet for ink jet record of this invention was manufactured. However, the lamination (what laminated 15micro of polyethylene on the coated paper front face by the EKUSUTORUJUN laminating method, and following lamination coated paper are called) of said base material is carried out to commercial coated paper (new Oji Co., Ltd. make, a trade name:O.K. coat, and 127.9g/m2).

[0049] The amount of applications is 8% water solution which mixed the PVA(whenever [Kuraray Co., Ltd. make, trade name-VA-117, degree-of-polymerization:1800, and saponification]: 98.5%) 40 section in the example 2 silica colloidal particle A100 section at MEIYABA 20 g/m2 Application desiccation was carried out on the front face of lamination coated paper so that it might become, and the sheet for ink jet record of this invention was manufactured.

[0050] The amount of applications is 8% water solution which mixed the PVA(whenever [Kuraray Co., Ltd. make, trade name-VA-224, degree-of-polymerization:2400, and saponification]: 88.5%) 40 section in the example 3 silica colloidal particle A100 section at MEIYABA 20 g/m2

Application desiccation was carried out on the front face of lamination coated paper so that it might become, and the sheet for ink jet record of this invention was manufactured.

[0051] The amount of applications is 8% water solution which mixed the PVA(whenever [Kuraray Co., Ltd. make, trade name-VA-135H, degree-of-polymerization:3500, and saponification]: 99% or more)40 section in the example 4 silica colloidal particle A100 section at MEIYABA 20 g/m2 Application desiccation was carried out on the front face of lamination coated paper so that it might become, and the sheet for ink jet record of this invention was manufactured.

[0052] The amount of applications is 8% water solution which mixed the PVA(whenever [Kuraray Co., Ltd. make, trade name-VA-140H, degree-of-polymerization:4000, and saponification]: 99% or more)40 section in the example 5 silica colloidal particle A100 section at MEIYABA 20 g/m2 Application desiccation was carried out on the front face of lamination coated paper so that it might become, and the sheet for ink jet record of this invention was manufactured.

[0053] The amount of applications is 12% water solution which mixed the PVA(whenever [Kuraray Co., Ltd. make, trade name-VA-124, degree-of-polymerization:2400, and saponification]: 98.5%)40 section in the example 6 silica colloidal particle B100 section at MEIYABA 20 g/m2 Application desiccation was carried out on the front face of lamination coated paper so that it might become, and the sheet for ink jet record of this invention was manufactured.

[0054] The amount of applications is 15% water solution which mixed the PVA(whenever [Kuraray Co., Ltd. make, trade name-VA-124, degree-of-polymerization:2400, and saponification]: 98.5%)40 section in the example 7 silica colloidal particle C100 section at MEIYABA 20 g/m2 Application desiccation was carried out on the front face of lamination coated paper so that it might become, and the sheet for ink jet record of this invention was manufactured.

[0055] The amount of applications is 8% water solution which mixed the PVA(whenever [Kuraray Co., Ltd. make, trade name-VA-124, degree-of-polymerization:2400, and saponification]: 98.5%) 40 section in the example 8 silica colloidal particle A100 section at MEIYABA 20 g/m2 Application desiccation was carried out at the PET film (the Toray Industries [, Inc.] make, 75micro, a trade name: Lumiler T, surface roughness Ra=0.02micrometer) used as a molding side so that it may become. Next, the amount of applications is acrylic ester adhesives (the Nippon Carbide Industries [Co., Inc.] make, a trade name: A-02) to the above-mentioned coated paper front face 10g/m2 Application desiccation was carried out so that it might become. Then, it was stuck by pressure in the calender of ***** and linear pressure 50 kg/cm so that adhesives might meet a lamination coated paper front face. Then, the PET film was removed and the sheet for ink jet record of this invention was manufactured.

[0056] The amount of applications is 15% water solution which mixed the PVA(whenever [Kuraray Co., Ltd. make, trade name-VA-124, degree-of-polymerization:2400, and saponification]: 98.5%)40 section in the example of comparison 1 silica colloidal particle D100 section at MEIYABA 20 g/m2 Application desiccation was carried out on the front face of lamination coated paper so that it might become, and the sheet for ink jet record of this invention was manufactured.

[0057] In the non-[synthetic] fixed form silica (silica [Japanese] industrial company make trade-name:Nipsil HD-primary [2 or] particle diameter: 11nm) 100 section with example of comparison 2 mean particle diameter of 3micro 15% water solution which mixed the PVA (whenever [Kuraray Co., Ltd. make, trade name-VA-124, polymerization-degree:2400, and saponification]: 98.5%)40 section is used, and the amount of applications is 20 g/m2 at MEIYABA. Application desiccation was carried out on lamination coated paper so that it might become, and the sheet for ink jet record was manufactured.

[0058] a non-[synthetic] fixed form silica (Japanese silica industrial company make and trade name:Nipsil LP --) with example of comparison 3 mean particle diameter of 9micro Primary particle diameter : 15% water solution which mixed the PVA(whenever [Kuraray Co., Ltd. make, trade name-VA-124, polymerization-degree:2400, and saponification]: 98.5%)40 section is used for the 16nm 100 sections. The amount of applications is 20 g/m2 at MEIYABA. Application desiccation was carried out on lamination coated paper so that it might become, and the sheet

for ink jet record was manufactured.

[0059] 8% water solution which mixed the PVA(whenever [Kuraray Co., Ltd. make, trade name-VA-124, polymerization-degree:2400 and saponification]: 98.5%)40 section is used for the alumina sol (company make [by the Nissan chemistry company] trade name: alumina sol -100) 100 section with a mean particle diameter of 10x100nm which is a 41st example particle dispersing element of a comparison, and the amount of applications is 20 g/m² at MEIYABA. Application desiccation was carried out on lamination coated paper so that it might become, and the sheet for ink jet record was manufactured.

[0060] The amount of applications is 15% water solution which mixed the PVA(whenever [Kuraray Co., Ltd. make, trade name-VA-124, degree-of-polymerization:2400, and saponification]: 98.5%)10 section in the anionic colloidal silica (Nissan chemistry company make trade name: Snow tex YL) 100 section with a mean particle diameter of 65nm which is the dispersing element of the 51st example particle of a comparison at MEIYABA 20g/m² Application desiccation was carried out on the front face of lamination coated paper so that it might become, and the sheet for ink jet record was manufactured.

[0061] The amount of applications is 15% water solution which mixed the styrene butadiene system latex (trade-name [the Nippon Zeon Co., Ltd. make and]:Nipol LX415A mean diameter: 110nm, Tg=27 degree C) 100 section in the example of comparison 6 silica colloidal particle A100 section at MEIYABA 20 g/m² Application desiccation was carried out on the front face of lamination coated paper so that it might become, and the sheet for ink jet record was manufactured.

[0062] 10% water solution of example of comparison 7PVA (whenever [Kuraray Co., Ltd. make, trade name-VA-117, degree-of-polymerization:1800, and saponification]: 98.5%) is used, and the amount of applications is 20 g/m² at MEIYABA. Application desiccation was carried out on lamination coated paper so that it might become, and the sheet for ink jet record was manufactured.

[0063] Commercial ink jet glossy paper GP-101 (selling agency: Canon, Inc. make) which has an example of comparison 8 ink fixing layer and a gloss manifestation layer was used.

[0064] The approach shown below estimated the paint film water resisting property of the sheet for ink jet record obtained in the [evaluation approach] examples 1-8 and the examples 1-8 of a comparison, ink absorptivity, ink absorption capacity, etc. About a feeling of gloss, and ink absorptivity, the glossiness of the solid part at the time of recording with a commercial ink jet printer (the Canon, Inc. make, trademark:BJC-600J), ink absorptivity, and printing concentration are shown.

Waterdrop was dropped on the record sheet for [waterproof] ink jets, waterdrop was wiped off after 30 minutes, the part immersed in waterdrop was rubbed by hand, and four steps of water resisting properties were evaluated. (O: Change was not seen at all by the ink acceptance layer.) O : the ink acceptance layer was able to be taken slightly. **: The ink acceptance layer was able to be taken partially. x: The ink acceptance layer was able to be taken completely.

[0065] [Ink absorptivity]

a. (ink rate of absorption)

Each monochrome of yellow, a Magenta, and cyanogen is printed and it observes whether lamination and ink imprint paper of fine quality to paper of fine quality to the printing side printed every 5 seconds from immediately after printing. Time amount until it stops imprinting at all is measured. Four steps of measured numbers of seconds were evaluated (less than [O:5 second], O:5 - 10 seconds, **:10 - 30 seconds, and more than x:30 second). The thing for 10 or less seconds excels [time amount / until ink dries] in ink absorptivity.

b. (ink absorption capacity)

Continuation solid printing of the three colors of yellow, a Magenta, and cyanogen is carried out at one place of 10cmx10cm around using the sheet for ink jet record of A4 size, and in order to observe whether ink is overflowing from the application layer, it observes whether lamination and ink imprint paper of fine quality to paper of fine quality to the printing side printed after 1 minute, 2 minutes, and 5 minutes from immediately after printing. Time amount until it stops imprinting at all was measured, and four-step evaluation was carried out as follows.

O : less than 1 minute.

O : 1 minutes or more and less than 2 minutes.

** : More than 2 minute, less than 5 minutes.

x : More than 5 minute

The printing concentration of the [printing concentration] black solid section was measured using the Macbeth reflection density meter (Macbeth, RD-920). The figure shown in front Naka is the average of 5 times measurement.

[0066] The feeling of gloss of the [feeling of gloss of the printing section (feeling of gloss)] printing section was viewed from the horizontal include angle of 20 degrees to the printing section, and was evaluated four steps as follows.

O : there is a feeling of gloss of the color photography of a silver salt method and this level.

O : although it is inferior to color photography, there is a high feeling of gloss.

** : Printing **** of coated paper.

x : General PPC ****.

A dot is expanded 100 to 200 times with a [configuration of dot] optical microscope, and the configuration of a dot is observed by the eye.

[0067]

[Table 1]

	インク吸収性		耐水性	印字濃度	印字部の 光沢	ドット 形状
	a. インク 吸性速度	b. インク 吸収容量				
実施例 1	◎	◎	◎	2.20	○	真円
" 2	○	○	◎	2.19	○	"
" 3	◎	◎	○	2.19	○	"
" 4	◎	◎	◎	2.23	○	"
" 5	◎	◎	◎	2.23	○	"
" 6	◎	◎	◎	1.91	○	"
" 7	◎	◎	◎	1.70	○	"
" 8	◎	◎	◎	2.27	◎	"
比較例 1	◎	◎	◎	1.15	○	"
" 2	◎	◎	△	1.30	×	ニギミ雲状
" 3	◎	◎	△	1.21	×	"
" 4	×	×	◎	2.25	○	真円
" 5	◎	×	◎	1.87	○	"
" 6	×	△	◎	2.06	○	"
" 7	×	×	×	2.40	△	円形
" 8	◎	◎	◎	1.41	△	ニギミ雲状

[0068] The sheet for ink jet record obtained by the configuration of this invention has ink absorptivity and a good ink absorption capacity, and a dot is a perfect circle-like after ink acceptance, and they are high-glossiness, high printing concentration, and the sheet for ink jet record that has high **** so that clearly from Table 1.

[0069]

[Effect of the Invention] The sheet for ink jet record of this invention has high gloss, and has the outstanding ink color enhancement, ink jet record (printing) fitness, high printing concentration, and weatherability.

[0070] In this invention, the color enhancement of ink is good, ink rate of absorption is quick, printing concentration is high, and the sheet for high gloss ink jet record with good weatherability, ink fixable, and printing fitness is obtained. The primary particle of a silica is formed spherically, and it is [a particle] easy, and is easy to form the obtained secondary particle, and a crack cannot produce a paint film easily, either. Moreover, the color enhancement of a silica of ink is good, and since a price is also low, it may spread also for a general application.

[Translation done.]

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1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

CORRECTION OR AMENDMENT

[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law

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[Procedure amendment 1]

[Document to be Amended] Specification

[Item(s) to be Amended] 0025

[Method of Amendment] Modification

[Proposed Amendment]

[0025] It is necessary to adjust the primary particle which constitutes the silica colloidal particle used for an ink absorbing layer to 3nm - 40nm. If set to less than 3nm, the opening between primary particles will become extremely small, and the capacity which absorbs the solvent and moisture in ink declines remarkably. On the other hand, when a primary particle exceeds 40nm, the condensed secondary particle becomes large and there is a possibility that the transparency of an ink absorbing layer may fall.

[Procedure amendment 2]

[Document to be Amended] Specification

[Item(s) to be Amended] 0030

[Method of Amendment] Modification

[Proposed Amendment]

[0030] although especially the amount of applications is not what is limited -- 1 - 100 g/m2 -- more -- desirable -- 5 - 60 g/m2 It adjusts. If there are few amounts of coating, a homogeneity paint film will be hard to be obtained, if many, effectiveness will be saturated, and it becomes

easy to produce a crack in a paint film. For example, 15 g/m² In order to obtain the above amount of high applications, the approach by thickening of application liquid and high-concentration-izing can be used, and two applications or more realize.

[Translation done.]